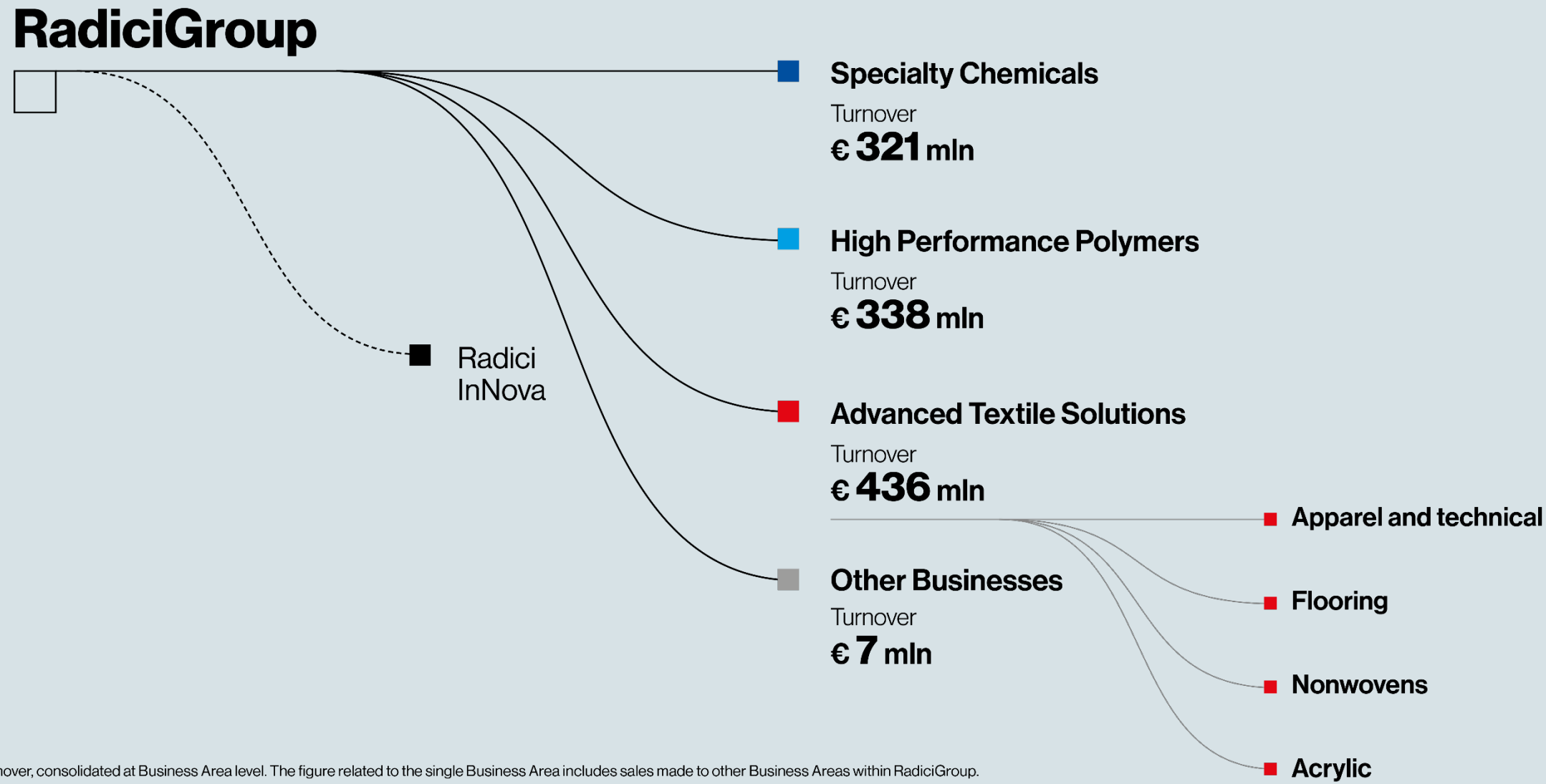
HIGH PERFORMANCE POLYMERS

Plastribution ; Sustainability Day
23rd February 2022
John Rae

Agenda

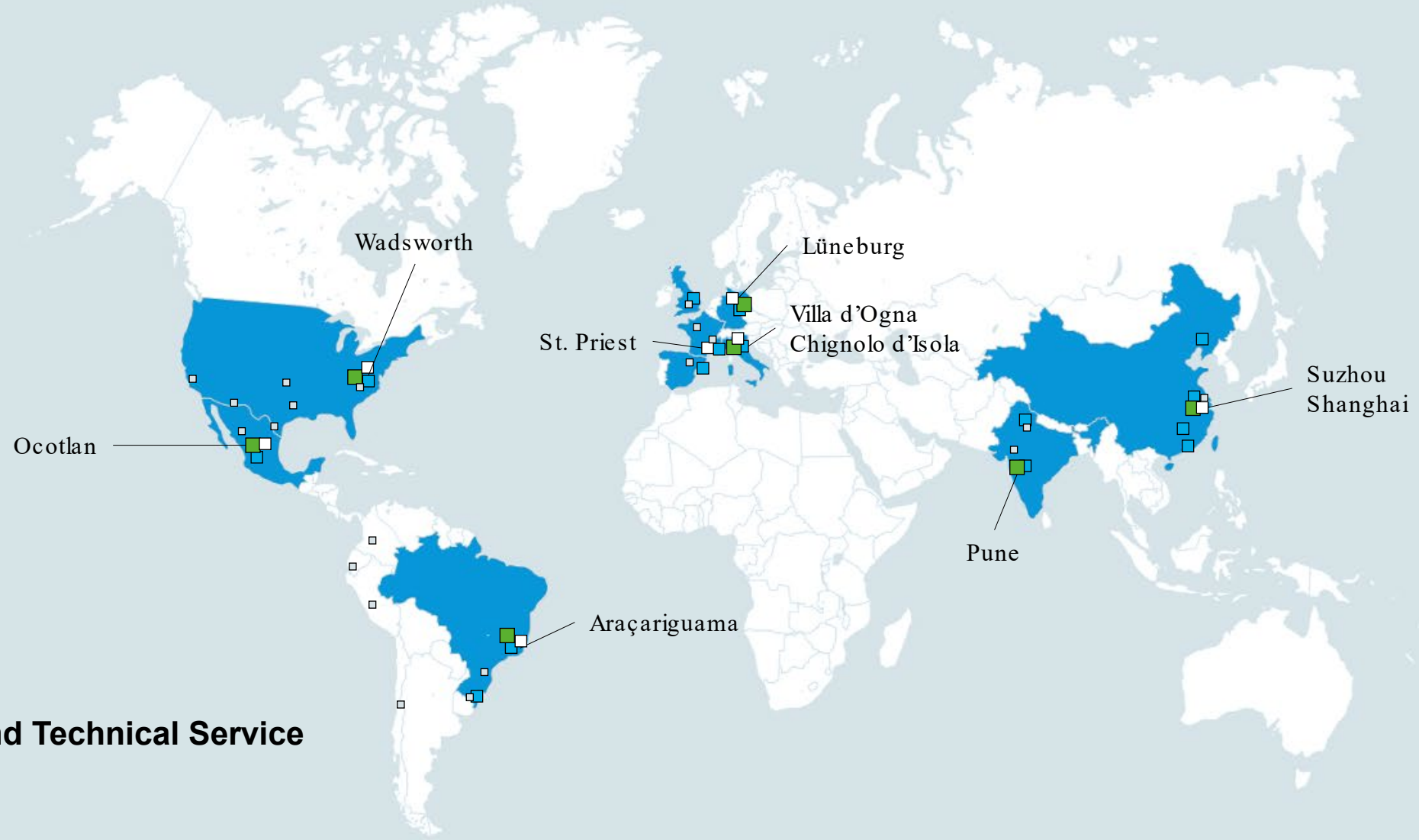
1. Introduction to Radici Group
2. Approach to Sustainability
3. Environmental Product Declarations
4. ReNYcle

Organizational structure



2020 turnover, consolidated at Business Area level. The figure related to the single Business Area includes sales made to other Business Areas within RadiciGroup.

High Performance Polymers - Global presence



- Production unit
- Development and Technical Service
- Sales office
- Warehouse

From RadiciGroup Vision & Mission to High Performance Polymers Facts

RadiciGroup

Vision

- **To be one of the leading chemical groups** in the polyamide, advanced textile solutions and high performance polymers production chain.

Mission

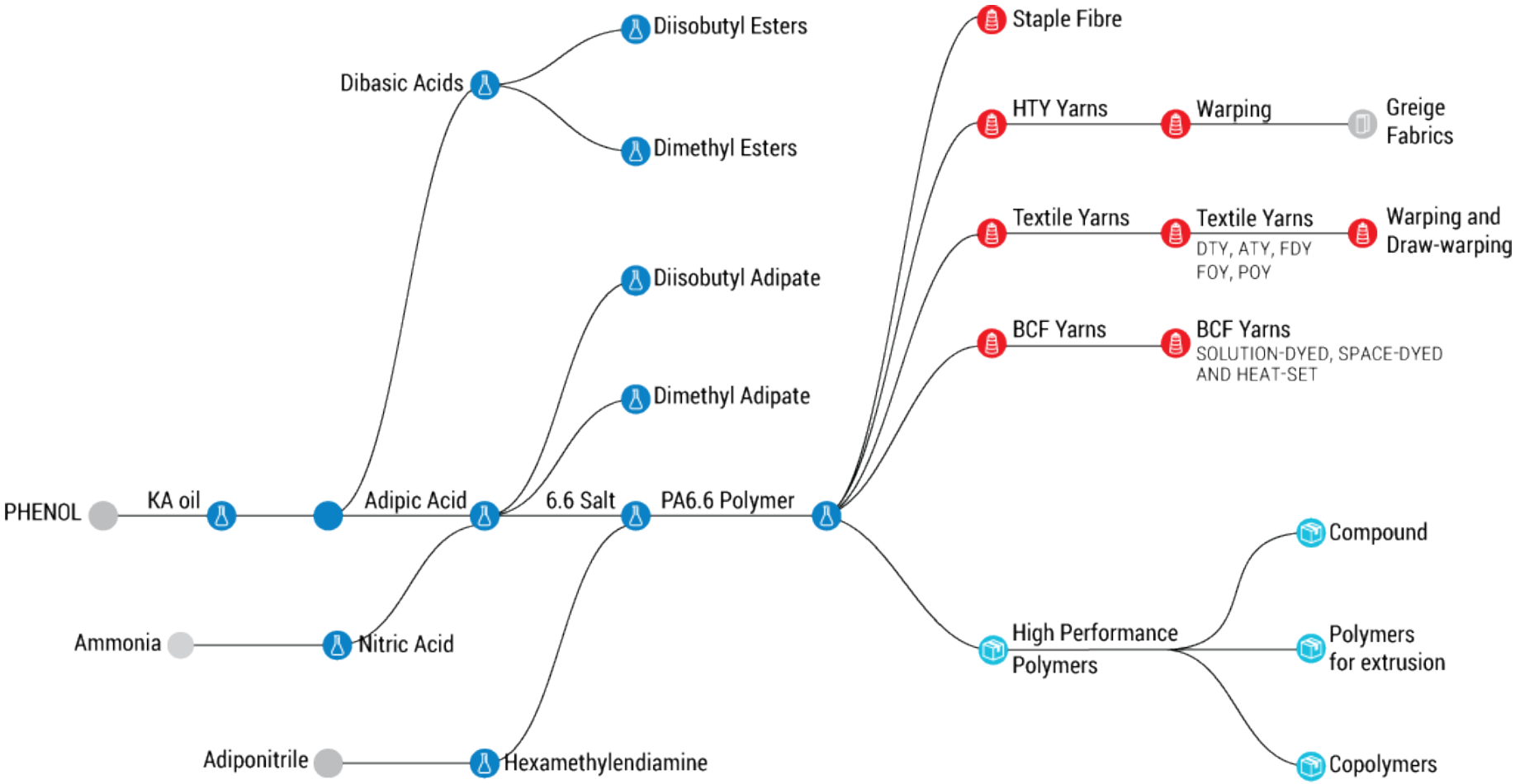
- To promote the **development of our businesses** while pursuing our Group values and culture.
- To pursue our vision by valorizing and **optimizing our resources**, **establishing alliances** and **searching for new markets**, including niche markets.
- To **embed sustainability** into new product and application **development.**

High Performance Polymers

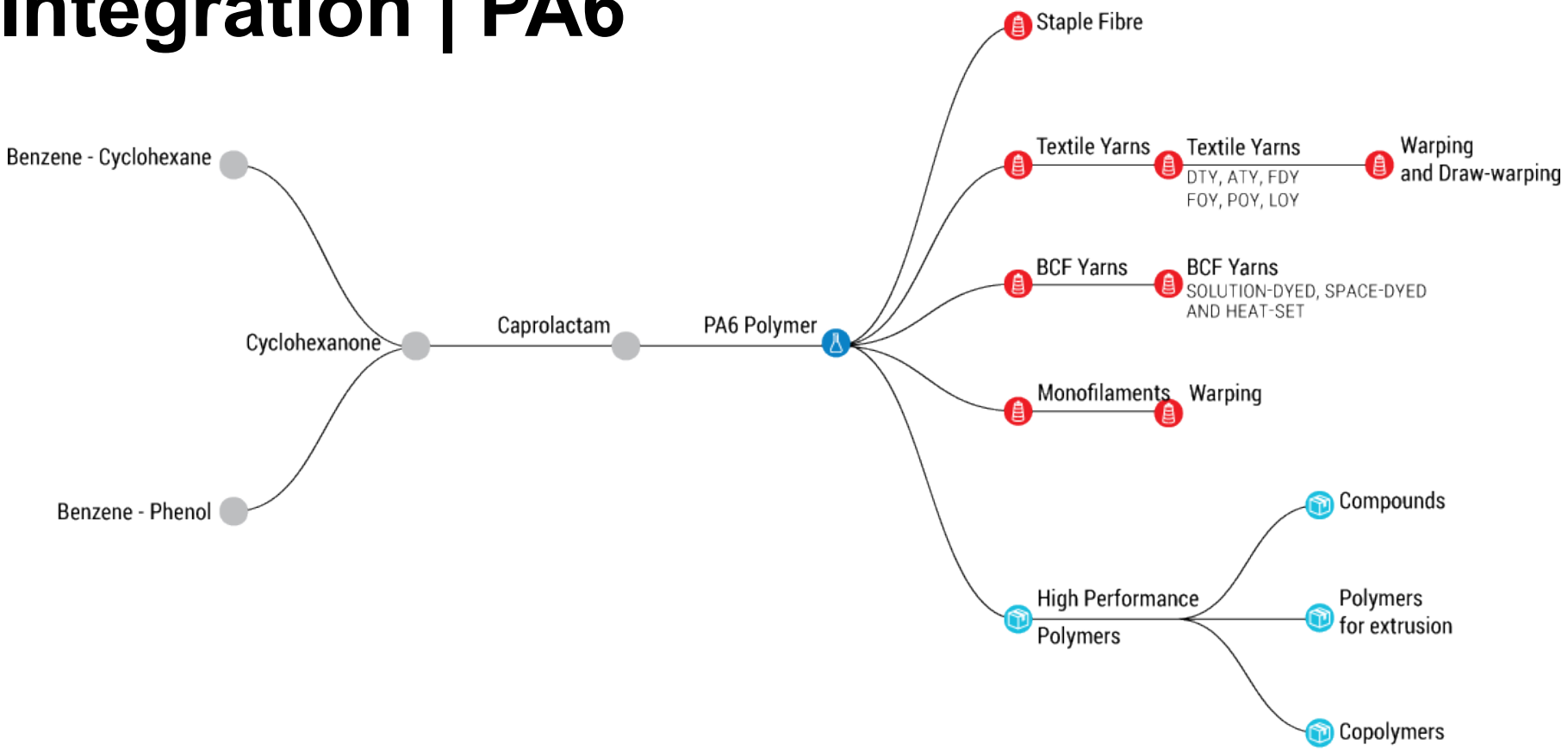
Facts

- Growth through **innovation and sustainability** of all our processes and products.
- **Vertically integrated** polyamide production and specific **chemical know-how**.
- **Worldwide presence** with a complete range of materials and **tailored solutions**.
- Our **people's expertise** and support, offering our customers a competitive advantage.

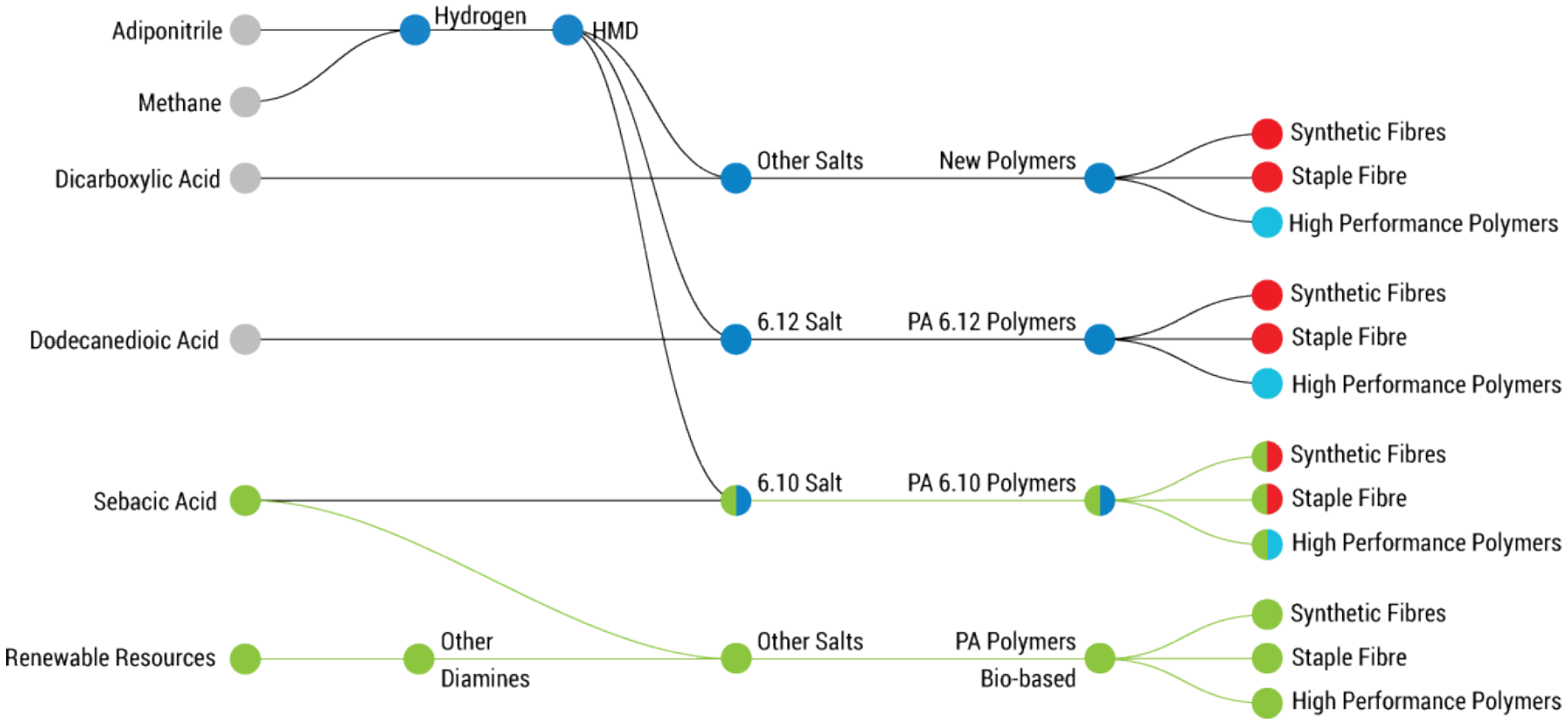
Synergy & Integration | PA6.6



Synergy & Integration | PA6



Synergy & Integration | PA 6.10, PA 6.12 and other polymers



RadiPol

RADILON

dorix 6.10

radilon 6.10

High Performance Polymers | Brands

PA-based engineering polymers and compounds (PA6, PA6.6, co-polymers, PA6.10, PA6.12, PPA and other special PA for high temperature resistant applications) for injection moulding, extrusion and blow moulding. Main applications in the automotive, furniture, electrical-electronic and technical/industrial sectors along with consumers goods.

Low-environmental impact PA-based compounds, manufactured using mainly post-industrial, selected secondary raw materials (PA6, PA6.6). Main applications in the technical/industrial sectors along with the automotive and electrical-electronic sectors.

PA and PBT-based flame-retardant compounds used for injection moulding and extrusion. Main application sectors in the electrical-electronic, automotive, technical/industrial sectors along with consumer goods.

PA6.6-based compounds including improved heat-resistance specialities (Torzen® Marathon) for automotive, electrical-electronic, industrial and consumer applications.

POM co-polymers destined to applications in the automotive and technical/industrial sectors.

Thermoplastic elastomers based on co-polyesters (TPE-E), SEBS and SBS for applications in the automotive and technical/industrial sectors along with consumer goods.

Special PA-based compounds, including long glass fibre reinforced grades (LFT) for injection moulding of high mechanical resistance items. Main applications in the automotive and technical/industrial sectors.

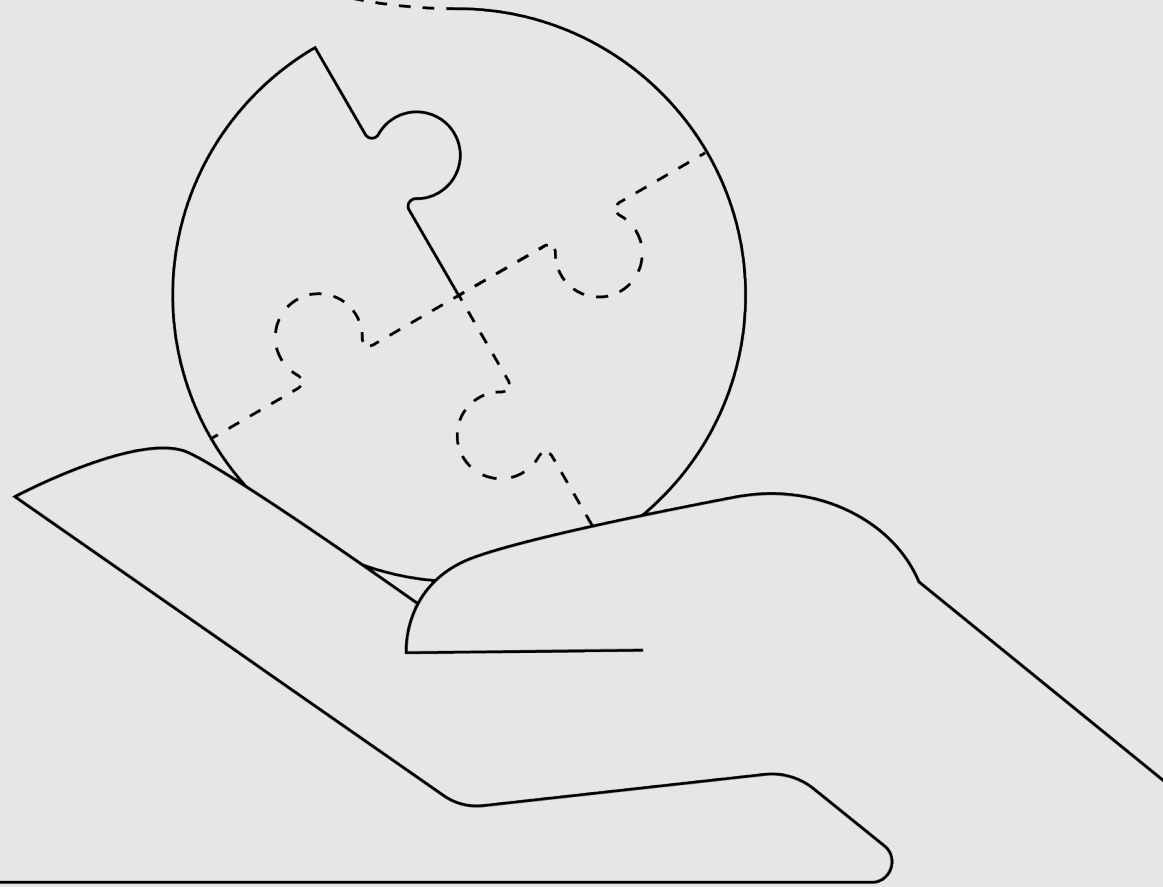
Polyester (PBT and PBT compounds) for injection moulding. Main applications in the technical/industrial sectors, along with the automotive and electrical-electronic sectors.

High performance PPS-based compounds, distinguished by their exceptional characteristics of chemical-thermal resistance and dimensional stability. Main applications in the automotive and electrical-electronic sectors along with consumer goods.

https://www.radicigroup.com/en/products/plastics

Sustainability

To RadiciGroup **sustainability** is the **ability to respond** day by day **to the needs of the present generation without compromising the ability of future generations to meet their** own **needs.**



The 2030 Agenda

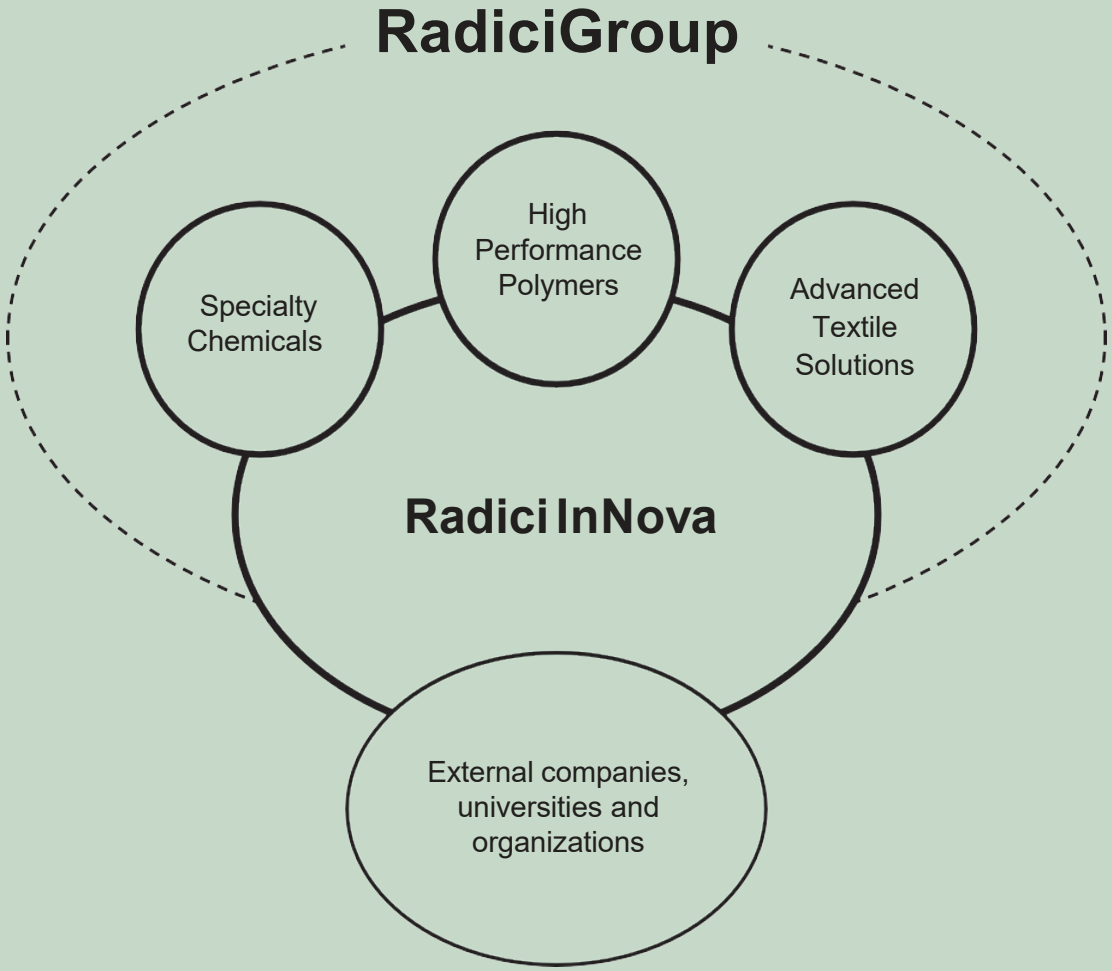
The 2030 agenda is a plan of action for People, the Planet and Prosperity adopted in September 2015 by the governments of the 193 country members of the United Nations.
It **incorporates the 17 Sustainable Development Goals** or SDGs.

RadiciGroup shares the Sustainable Development Goals and contributes tangibly to their implementation.

Radici InNova: Innovation and Sustainability

It was established in 2020. Its mission:

- To develop **sustainable research and innovation processes, with measured impacts**, that respond to the challenges launched by the EU in terms of **circular economy**.
- To anticipate market and stakeholders demands **offering innovative, highly performing products with a low environmental impact**.



Sustainability, in facts

237 mln €

investments to support the competitiveness
of Group companies over the 2016-2020 five-year period.

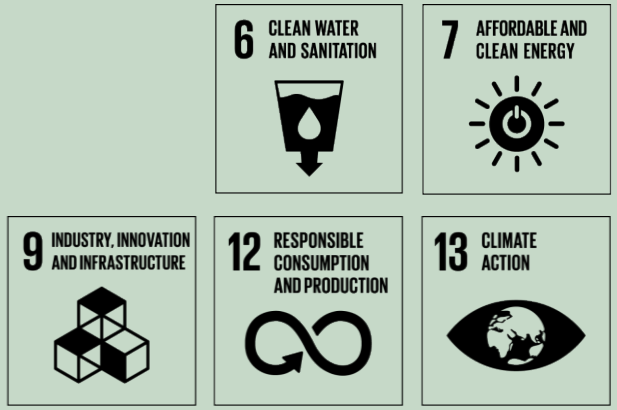
Of which **49 mln €**
the amount invested in 2020.

3.4 mln €

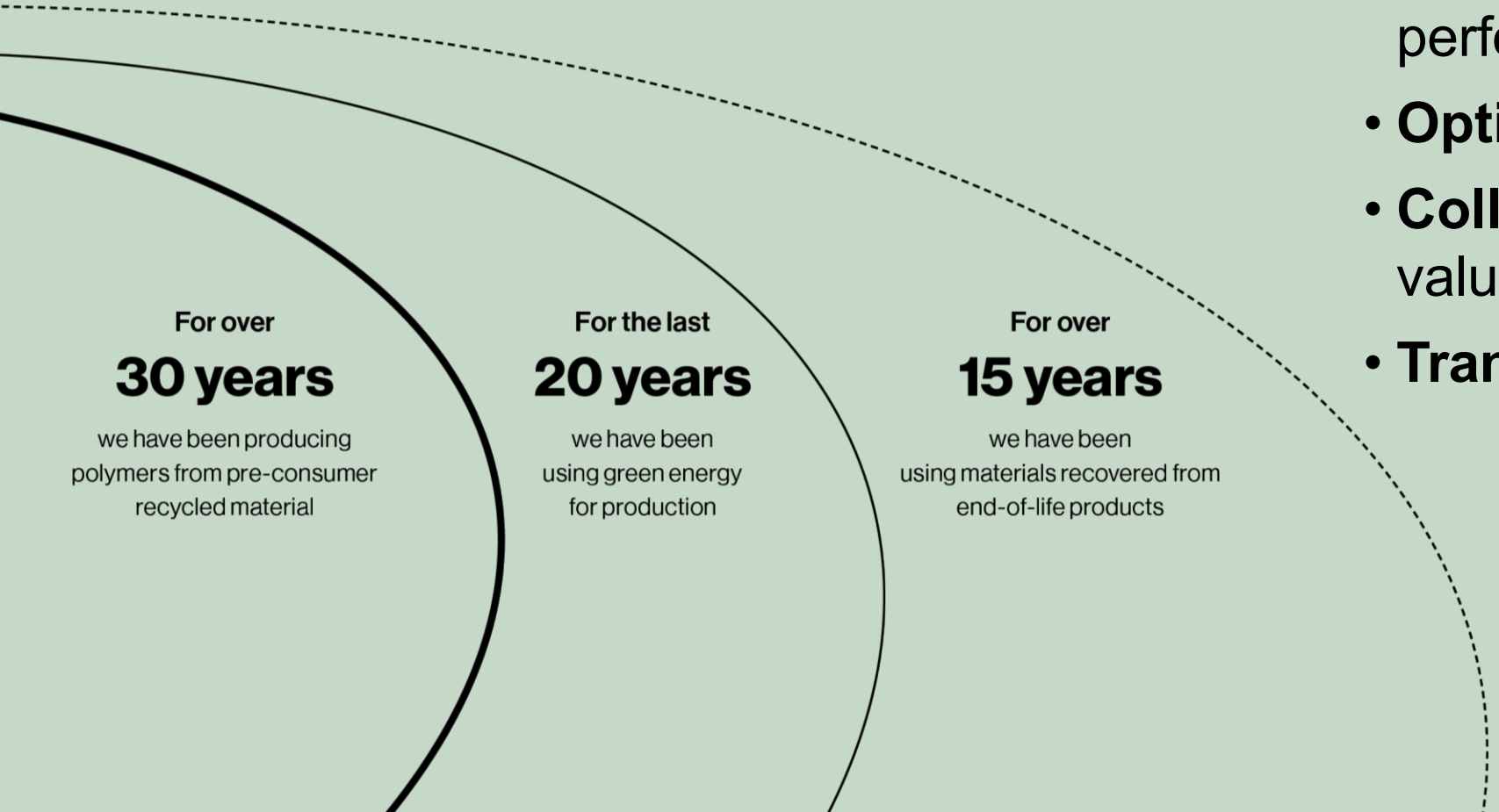
environmental investments made in 2020 related to the introduction of Best Available Techniques, efficiency improvement, emission abatement, and research and development activities directed at the development and adoption of low-impact processes and products.

3.4 mln €

Costs for environmental management and protection (certifications, waste disposal, wastewater treatment, etc.) at the Group companies in Italy.



RadiciGroup Product Sustainability comes from afar



- **Innovation and ecodesign** as guidelines.
- **Sustainable and measured** performance.
- **Optimized** production systems.
- **Collaboration** with the entire value chain.
- **Transparent communication**.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

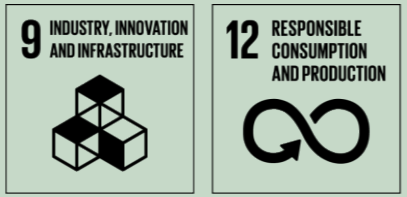
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Why choose RadiciGroup low-environmental impact products?

Because all RadiciGroup materials are recyclable and durable, key elements in terms of circularity

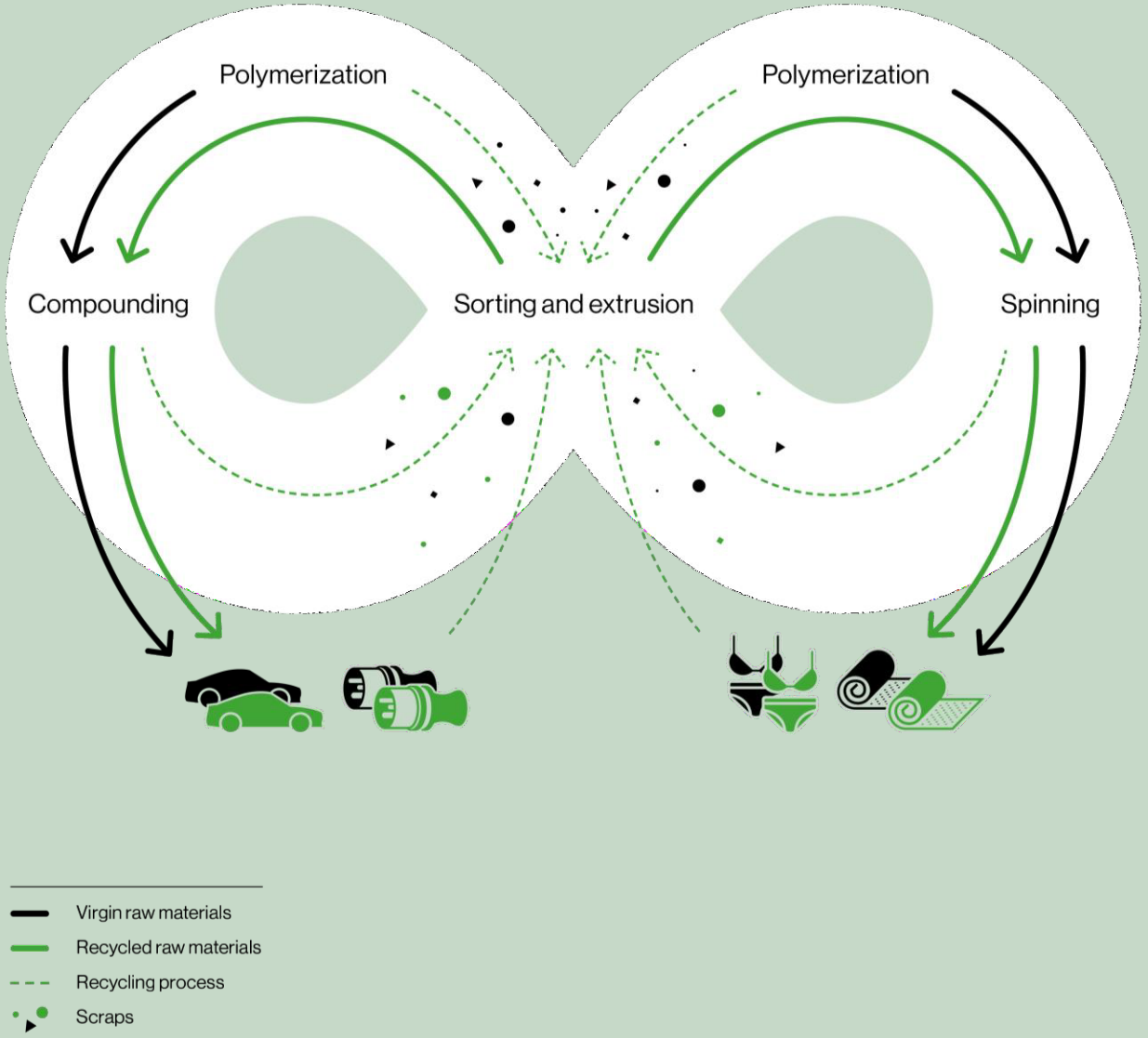
Because they can be:

- Manufactured using **recycled materials** to reduce the use of valuable virgin raw materials and give new life to pre- and post- consumer scrap.
- Manufactured using **green energy**, which decreases dependence on fossil fuels.
- Bio-based i.e. manufactured, entirely or in part, from **natural raw materials**, vegetable sources that do not compete with plants cultivated for food.
- Bio degradable: **able to separate into their different components** thanks to bio-chemical processes.



Nylon recycling system for circularity

RadiciGroup, thanks to its long-standing know-how in material formulation and recycling, is able **to convey scraps either in the same industry from which they originated or into a different one**. This depending on of the specific characteristics of the materials and the performance expected from final applications, **choosing the most sustainable solution**.



Our capital is, above all, human

- **95%**
  Permanent employees to total employees
- **92%**
  Percentage of **collective bargaining agreement**
- **52%**
  Gross Margin (Value Created) distributed to employees

of value added

2,942
Employees

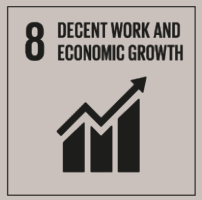
3 GOOD HEALTH AND WELL-BEING

8 DECENT WORK AND ECONOMIC GROWTH

Health and Safety at work

RadiciGroup safeguards the Health and Safety of workers monitoring performances as for:

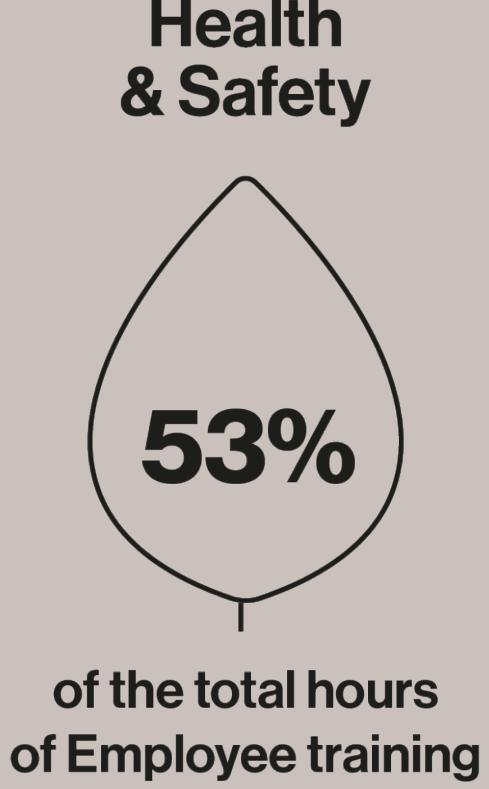
- **Risk analysis and management.**
- **The development of preventive and protective measures.**
- **Targeted Health and Safety projects.**
- **Worker training and information.**



Health and Safety at work

All workers are called upon to develop safety management systems.

The contribution of each worker is fundamental for the safety of all.



RadiciGroup and local communities: a single entity

› From RadiciGroup to Local Communities

- A culture with **high Health and Safety standards** in all the world**.**
- **Promotion of local social sustainability** through welfare policies in the various countries.
- **Engine of development in emerging countries** and a solid employment opportunity for the younger generation in mountain areas.

15

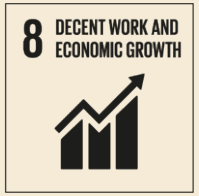
nations

5

different languages

› From Local Communities to RadiciGroup

- **Support and closeness.**
- **A unique and special know-how.**
- **An inclination for** organizational and production **flexibility** typical of local communities.
- **Local Suppliers,** with whom RadiciGroup has established a relationship of trust and loyalty.



Sport that coaches for life

Attention
and support to:

Schools

Sports associations

The education of the next generations can be achieved through sport.
Sport and work are based on the same values: sacrifice, effort and the will to always improve to achieve ambitious results.

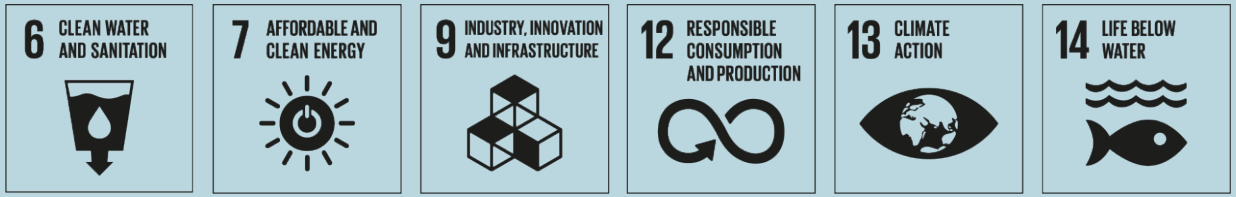
RadiciGroup supports local associations, mainly youth academies, which have the goal of teaching a sport, but above all, of contributing to the growth of young people. An example of this commitment is the Group's support to **Ski Club RadiciGroup.**
Furthermore, RadiciGroup is the official **"Sponsor del Cuore" of the Atalanta Bergamo Football Club.**

Sci Club
RADICI GROUP

Our footprint is our mark of sustainability

Energy
Emissions
Water
Waste
Materials used

Are our environmental key-topics

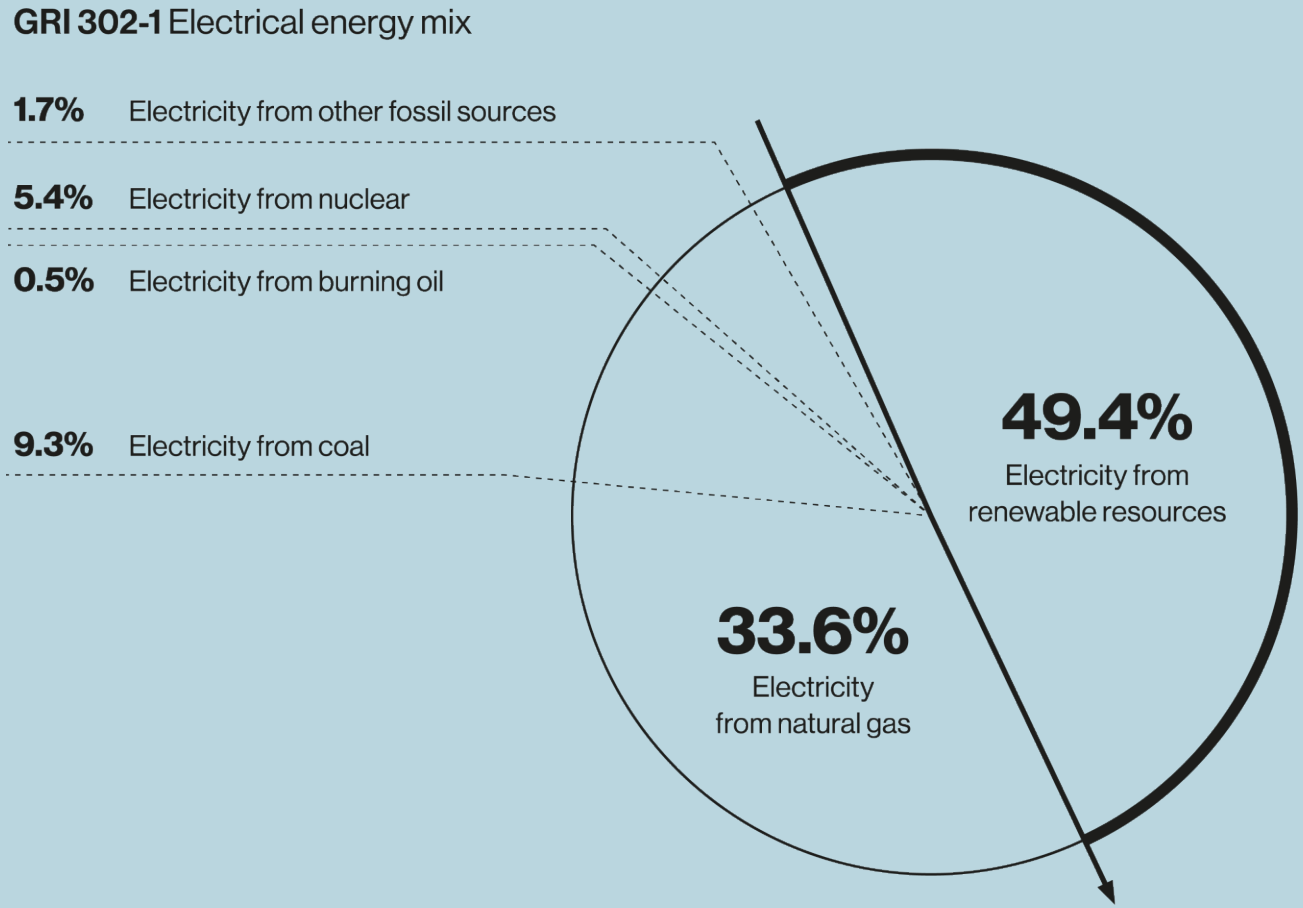


Our footprint is our mark of sustainability

Also in 2020, several RadiciGroup plants were powered entirely, or for a large part, **with green energy** and **in Italy they could count on the hydroelectric power of supplier-partner Geogreen.**

GEOGREEN
gas, power and efficiency

When the energy source is not renewable, it is natural gas, the least impacting fossil source, to be the chosen solution.



Our footprint is our mark of sustainability

Companies using 100% or mostly renewable source energy:

100%

Companies using 100% green energy

- Radici Novacips - (Villa d'Ogna) Italy
- Radici Novacips - (Chignolo d'Isola) Italy
- Radici Plastics - Brazil
- Radici Plasitcs - Germany
- Radici Yarn - (Ardesio) Italy
- Radici Partecipazioni - (Gandino) Italy
- Tessiture Pietro Radici - (Gandino) Italy – **NEW 2020**

- Polymerization of Radici Yarn - (Villa d'Ogna) Italy
- Polymerization of Radici Fil - (Casnigo) Italy

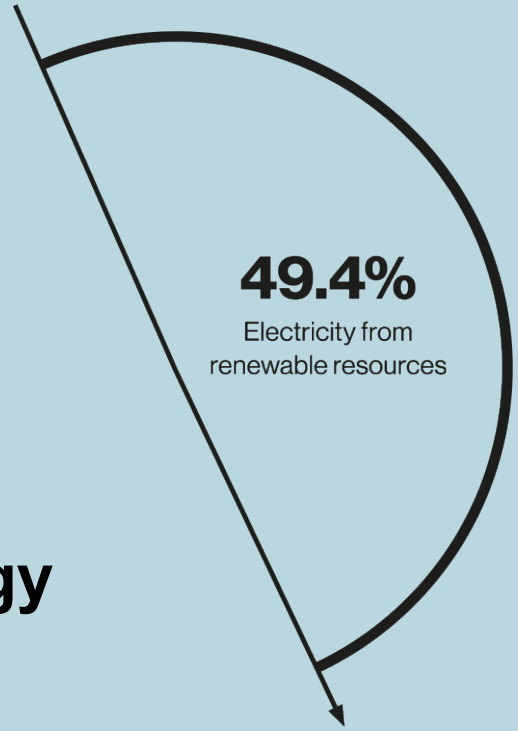
80%

Companies using 80% Renewable source energy

- Radici Fibras - Brazil

+6%

Renewable source energy 2018-2020



We aim low only when our target is emissions

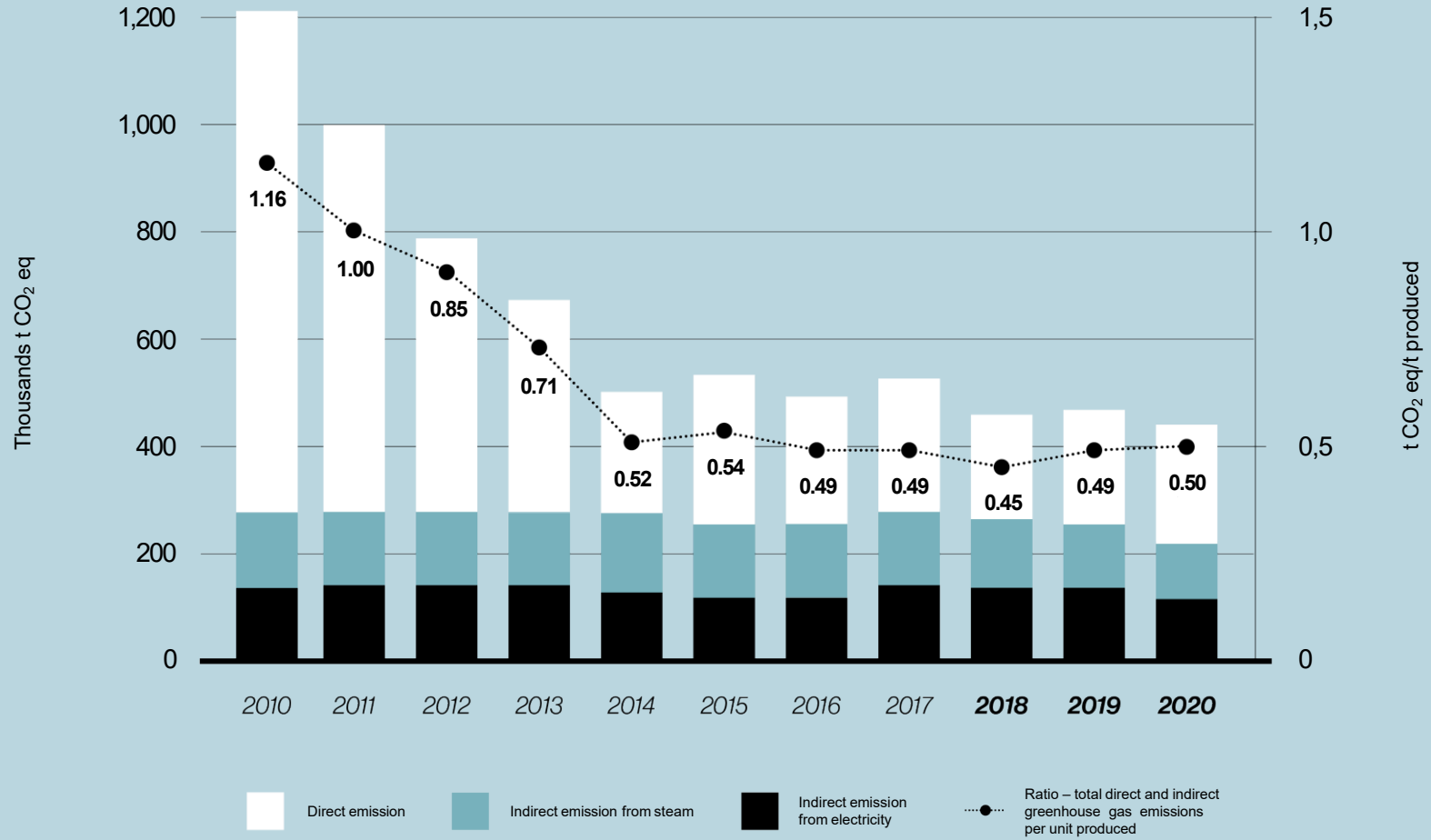
2010-2020

- 64%

total emissions

- 57%

ratio - total emissions per unit produced



Saving water is our second nature

Water used in 2020

99.84%

water not taken away from human consumption

Water saved

1 mln

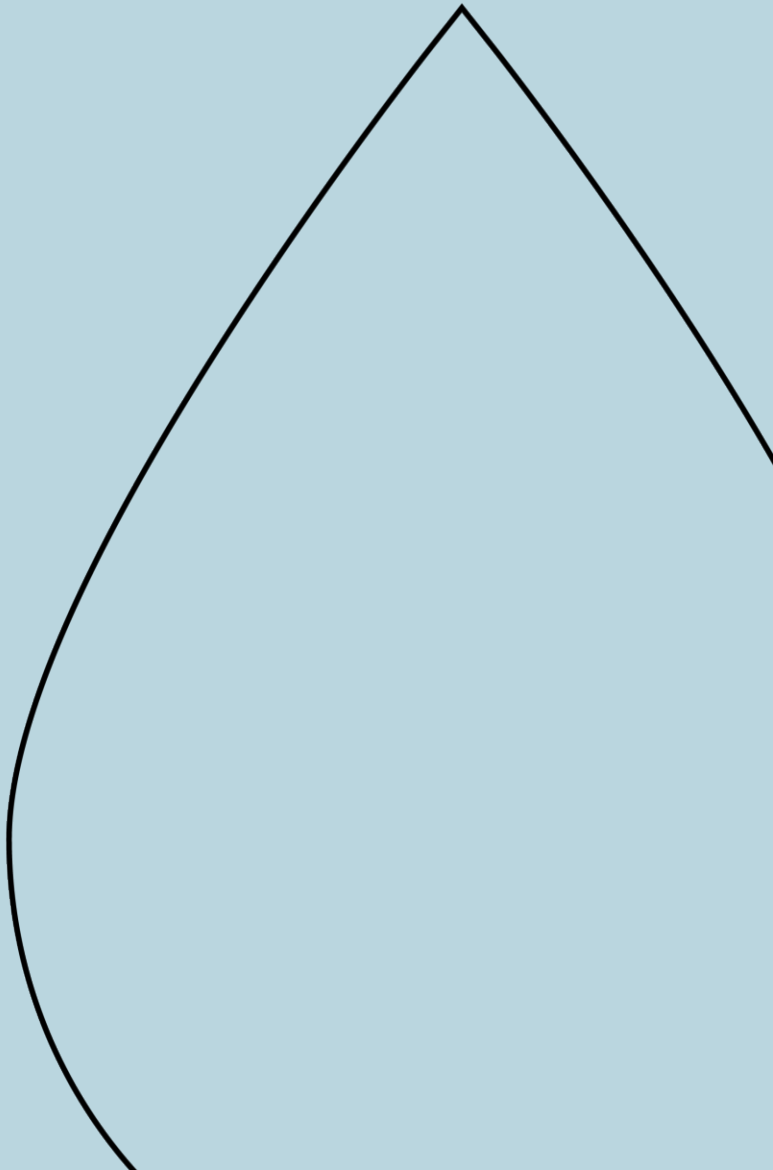
cubic meters saved in 2018-2020, corresponding to the average water consumption of 6,300 families

70%

water saved compared to theoretical requirement

from 1 to 60.5

water is used from from 1 to 60.5 times in the Group plants



Management systems

Voluntary Quality, Safety, Environmental and Energy management systems, implemented according to the most advanced and recognized international standards, make up a framework of best practices.

They are a valuable tool for sustainable management.

Management systems

Certifications also **attest to RadiciGroup commitment to environmental impact transparent** and third-party-verified **communication.**

Certifications for the 22 companies in the Sustainability Report scope.

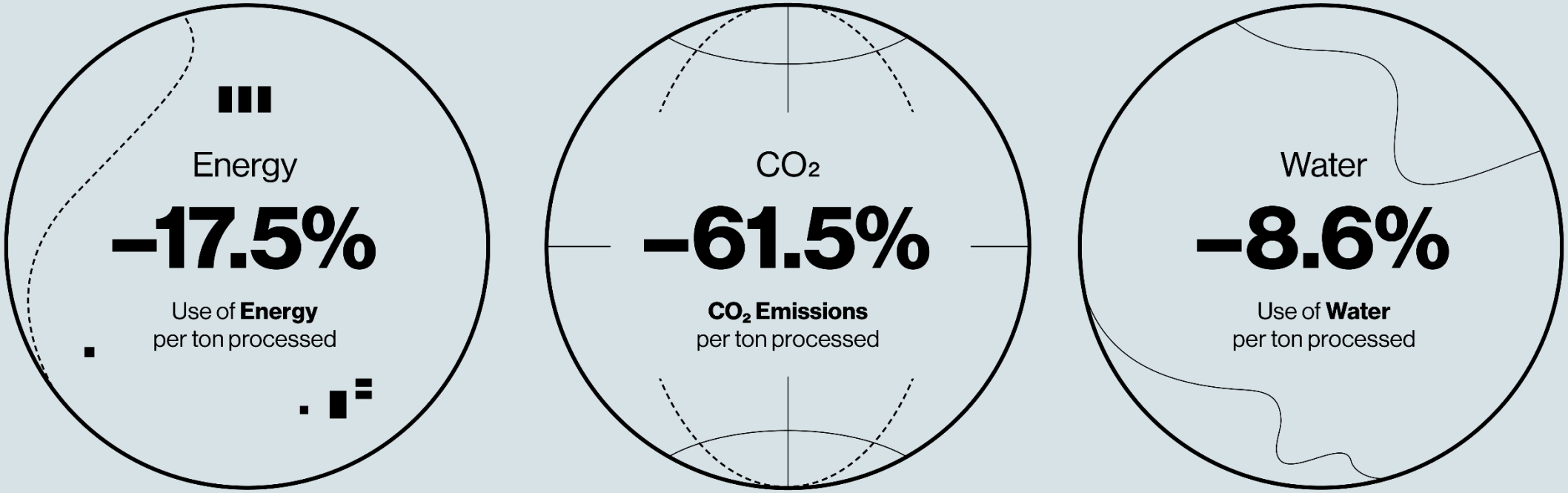
- **20** Quality certifications
- **06** Automotive certifications
- **15** Environmental certifications
- **06** Energy certifications
- **14** Health and Safety certifications

+ Product related certifications

Table of RadiciGroup Certifications *(as at September 2021)*

RadiciGroup Site	ISO 9001	IATF 16949	ISO 14001	ISO 45001	ISO 50001
Corporate					
Radici Partecipazioni S.p.A.	●				
Business Area: Specialty Chemicals					
Radici Chimica Novara S.p.A.	●		●	●	●
Radici Chimica Deutschland GmbH	●		●	●	●
Business Area: High Performance Plastics					
Radici Novacips S.p.A. - Villa d'Ogna	●	●	●	●	
Radici Novacips S.p.A. - Chignolo	●		●	●	
Radici Plastics GmbH	●	●	●	●	●
Radici Plastics Ltda (Brasil)	●	●	●	●	
Radici Plastics (Suzhou) Co. Ltd.	●	●	●	●	
Radici Plastics Usa, Inc.	●	●	●	●	
Radici Plastics Mexico S. De R.l.	●	●			
Business Area: Advanced Textiles Solutions					
Radici Fil S.p.A.	●		●	●	●
Logit Sro	●		●	●	●
Radici Yarn S.p.A. - Villa d'Ogna	●		●		
Radici Yarn S.p.A. - Ardesio	●		●		
S.c. Yarnea Srl	●		●	●	
Radici Chemiefaser GmbH					●
Radicifibras Ltda	●				
Noyfil S.p.A. - Chignolo	●			●	
Noyfil S.p.A. - Andalo Valtellino	●			●	
Noyfil Sa - Stabio	●		●		
Cordonsed Sa					
Tessiture Pietro Radici S.p.A.	●		●	●	

Sustainability: Last 10 years' milestones



Data Source: RadiciGroup Sustainability Reports - www.radicigroup.com

“Production Chain” Environmental Product Declarations

Anticipating the Circular Economy action plan that the European Union has been implementing, RadiciGroup completed the “cascading” certification of the environmental impact of its polyamide production chain:

1) Introducing production chain Product Category Rules (PCRs)
2) Product Environmental Footprint (PEF) impact testing and calculation methods to the base polymer.
3) Environmental Product Declarations (EPDs) for engineering plastics and yarns,

The end result of a coordinated program of activities and investments aimed at reducing the environmental impact of products, including: rigorous management of corporate purchasing and production; reduced consumption; replacement, wherever possible, of heavily polluting sources; investments in technologies for emission reduction; research and development; and utmost attention to the efficient use of resources and to quality scrap recovery.

“Production Chain” Environmental Product Declarations

EPD®

Radilon® and Heramid® have a certified Environmental Product Declaration (EPD) giving information about the environmental performance, contents and recycling, which have been controlled and verified according to the requirements of the International EPD® System.

Radilon® A RV 300	year	2012	2016
Global Warming Potential	Kg CO2 eq	**6,82**	**5,74**
Heramid® A GF 030	year	2013	2017
Global Warming Potential	Kg CO2 eq	**1,21**	**0,643**

Radilon® Registration number: **S-P-00554**
Heramid® Registration number: **S-P-00707**
More information is available at www.environdec.com

“Production Chain” Environmental Product Declarations

The improvement achieved in the environmental performance of the EPD-certified products is attributable to;

1. 100% use at the Italian production plants of hydroelectric power, which is supplied by Geogreen (a related Radici family company, created with the purpose of supplying renewable “zero kilometre” energy to RadiciGroup companies)
2. Continuous production process improvements, which have been achieved, in no small measure, through the actions performed specifically for the preparation of the product environmental declarations.

By consulting the website www.radicigroup.com, it is possible to learn how deep our commitment is to sustainability improvement

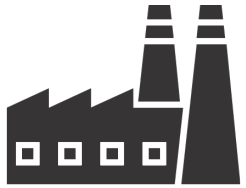
“Production Chain” Environmental Product Declarations

The consolidation of the procedures developed for EPD Process Certification now provides a robust methodology and reliable data, enabling the Group to compile “Environmental Impact Sheets” that can be distributed to customers who use materials produced by all plants in Europe including those yet not covered by EPDs.

The Environmental Impact Sheets, although not certified are based on the LCA method developed for the EPD’s and are therefore highly reliable.

RENYCLE®

nylon after nylon



New **sustainability**-oriented product range of **materials** from **post industrial** and **post consumer** sources

Lower and measurable environmental impact

- **Safety**
- **Reliability**
- **Traceability**
- **Quality**

CERTIQUALITY

ATTESTATO DI CONVALIDA
DICHIARAZIONE AMBIENTALE DI PRODOTTO
ENVIRONMENTAL PRODUCT DECLARATION
P4419

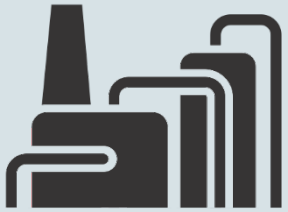
ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
DAP n. 003 H
Membro degli Accordi di Mutuo riconoscimento EA, IAF e ILAC.
Signatory of EA, IAF and ILAC Mutual Recognition Agreements.

EPD®
THE INTERNATIONAL EPD® SYSTEM

RENYCLE® is the answer to:

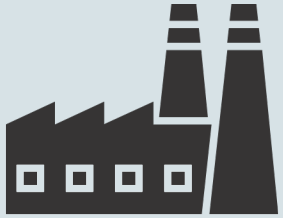
- **Customers** who want to reduce the environmental impact of their finished products and are committed to make environmentally conscious choices.
- **The evolving legislative context,** which is shifting more and more towards the reuse and recycling of materials now considered waste (so-called End-of-Life materials).
- **The need for stricter controls and standards** to guarantee the safety and traceability of the raw materials used.
- **Society** in general, which is asking industry to make a greater and more tangible commitment to sustainability.
- **Ensuring the right selection, treatment and characterization** of post-consumer and post-industrial materials.

Product definition by raw material source



Virgin material

This material is produced starting from the chemical precursors of the base polymers.



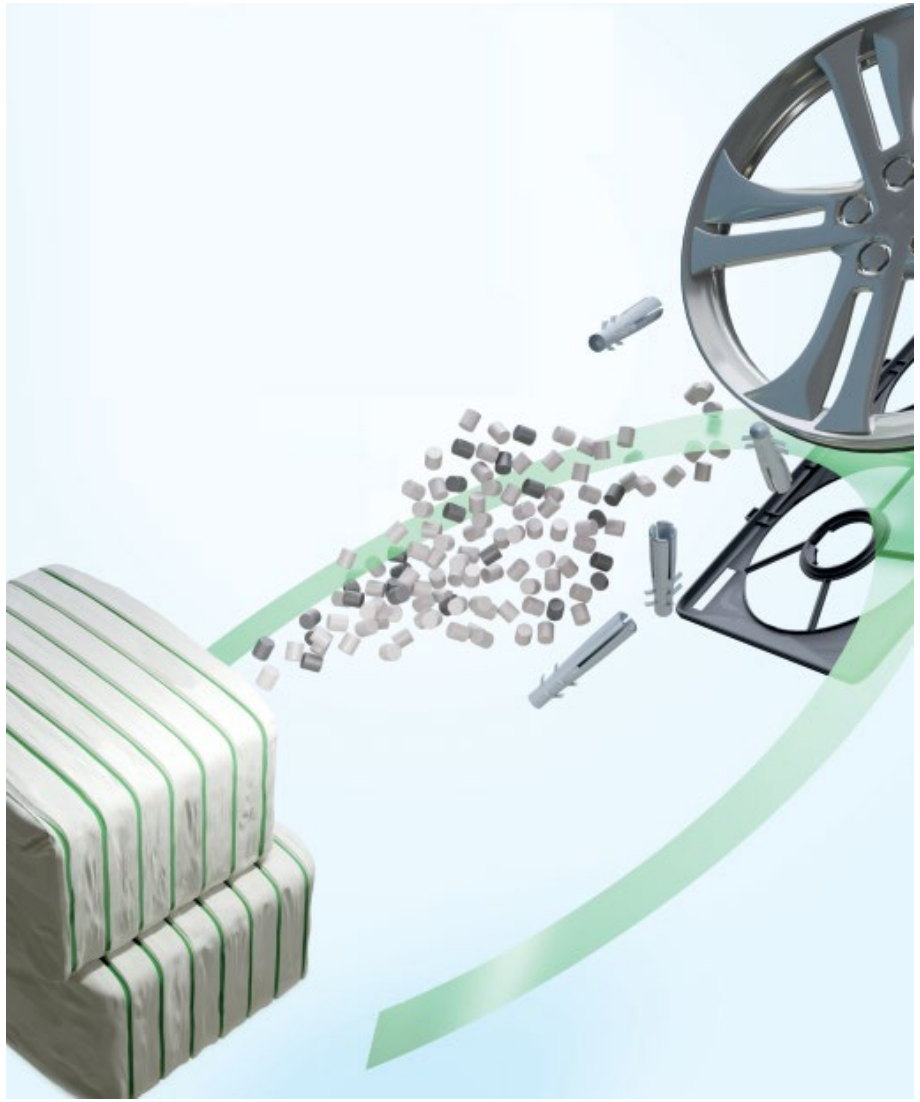
Post-industrial material

Material diverted from the waste stream during a manufacturing process.

Post-consumer material

Material generated by households or by commercial, industrial and institutional facilities as end-users of products which can no longer be used for their intended purpose.

Consolidated tradition of post-industrial material production

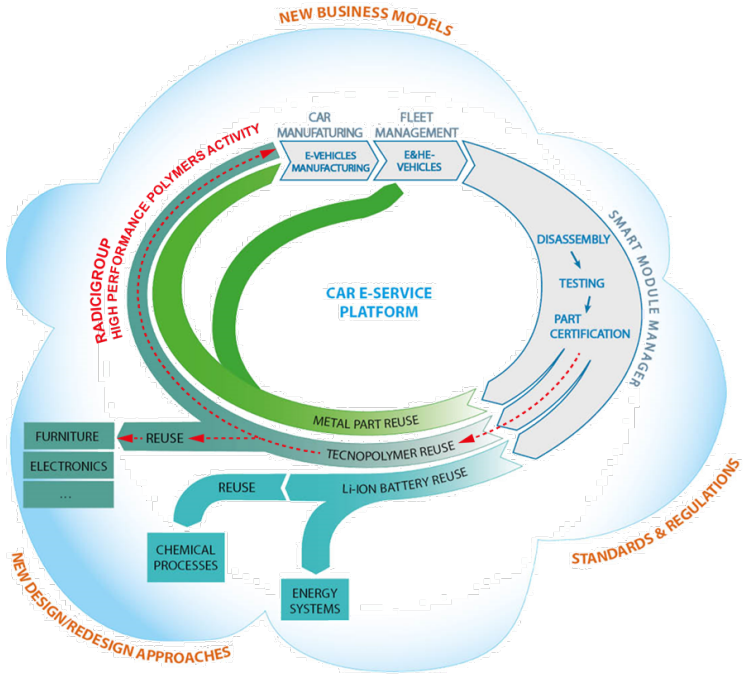


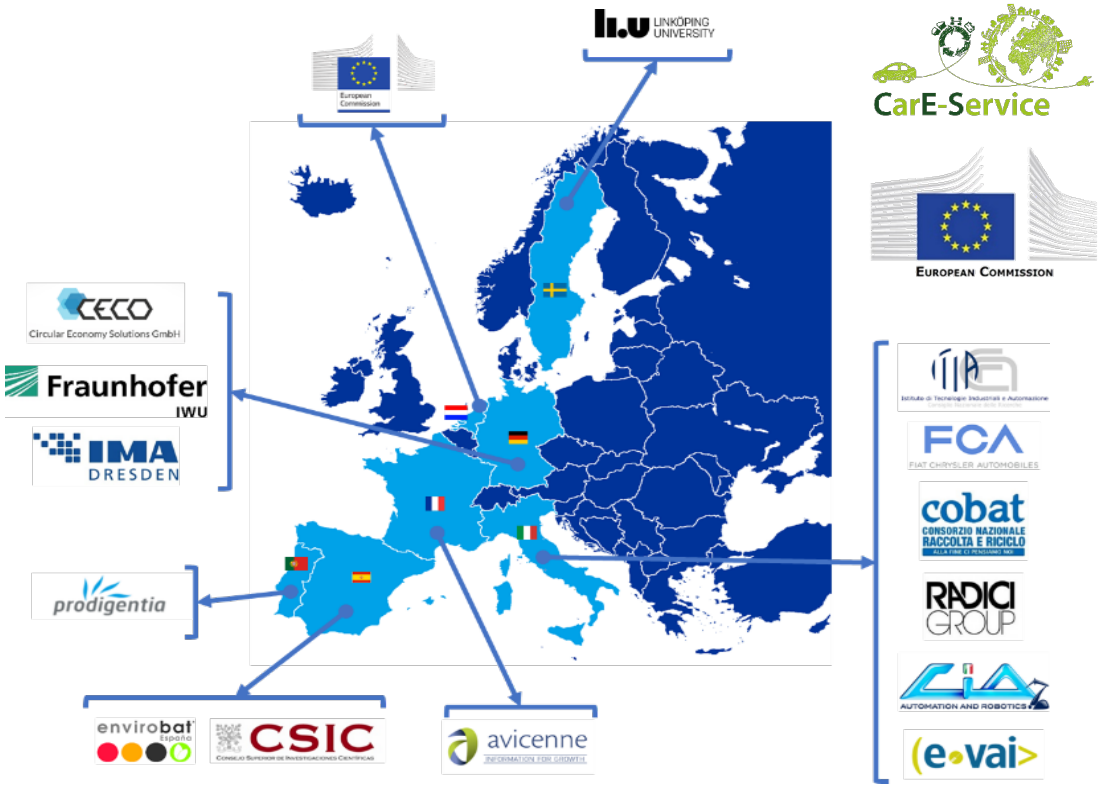
Low environmental impact PA6 and PA66 polymers made of 100% selected materials, primarily recovered from the production units of RadiciGroup High Performance Polymers Business Area.

Outstanding experience in post-consumer materials

Circular Economy Business Models for innovative hybrid and electric mobility through advanced reuse and remanufacturing technologies and services.

- **Acronym:** Car-E Service
- **Duration:** 42 Months
- **Kick Off:** 1 June 2018
- **Type:** H2020-CIRC-2017
- **15 Partners**





This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 776851

RENYCLE® Production process stages

Collecting

Selecting

Contaminants

Metals

Cleaning

PA

Raw material preparation

Grinding

Drying

Regranulation

Chemical analysis

Formulation tuning

is performed to meet the requirements of our customers' applications

Material characterization

Production

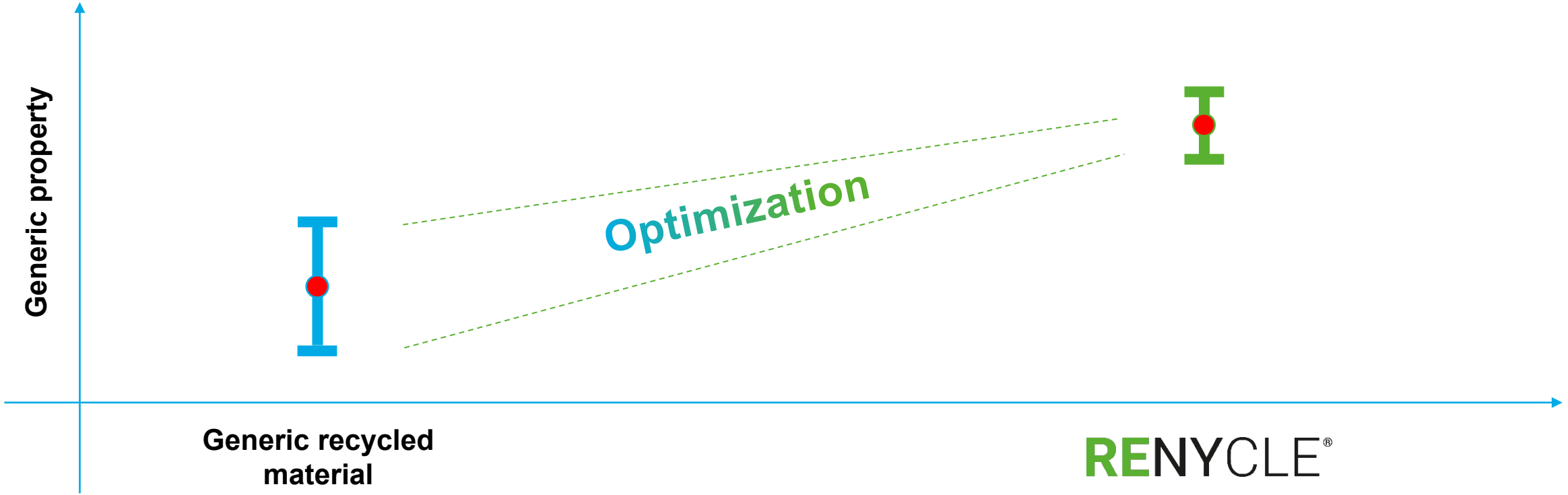
RENYCLE®

RENYCLE® Scope

Property

Variability

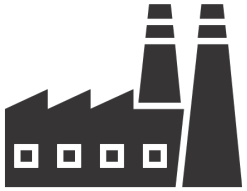
The experience gained in post-industrial materials production and the opportunity to participate in circular economy projects has allowed us to develop a production process that **thoroughly monitors raw material selection and treatment** in order to optimize material characteristics and variability.



RENYCLE® Current product offering

Post-consumer base

5 grades

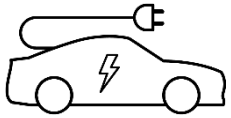


Post-industrial base

4 grades

General purpose

Automotive



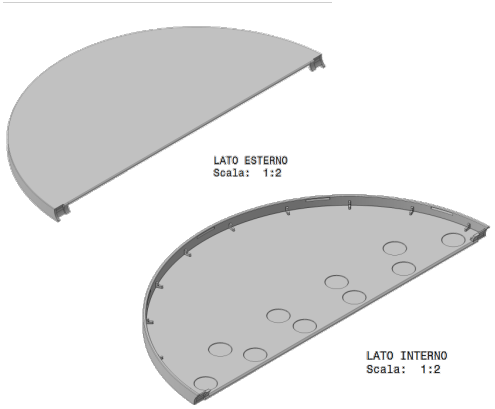
E-mobility

Electrical & Eletronic

Hydrolysis resistance and flame retardancy (red phosphorus-free, and halogen-free) are just some achievable properties for this new materials family.

RENYCLE® Post-consumer grades

Name	Material Description	Market
RENYCLE S GF3001K 3030 BK	PA6-GF30 heat stabilized	Auto, general purpose
RENYCLE S GF2501 HF0 3033 BK	PA6-GF25-HF FR	E&E, Auto (e-mobility)
RENYCLE S N101 3030 BK	PA6	General purpose
RENYCLE S GF3003 3033 BK	PA6-GF30	General purpose
RENYCLE S GF1501K 3030 BK	PA6-GF15 heat stabilized	Auto, general purpose



Currently only available in the EU

RENYCLE®
nylon after nylon

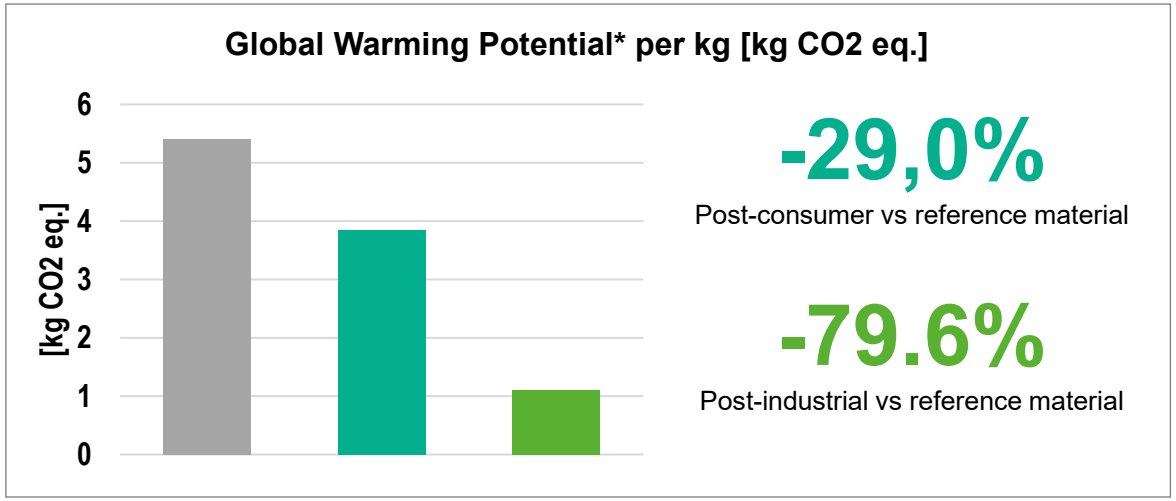
RENYCLE® Post-industrial grades

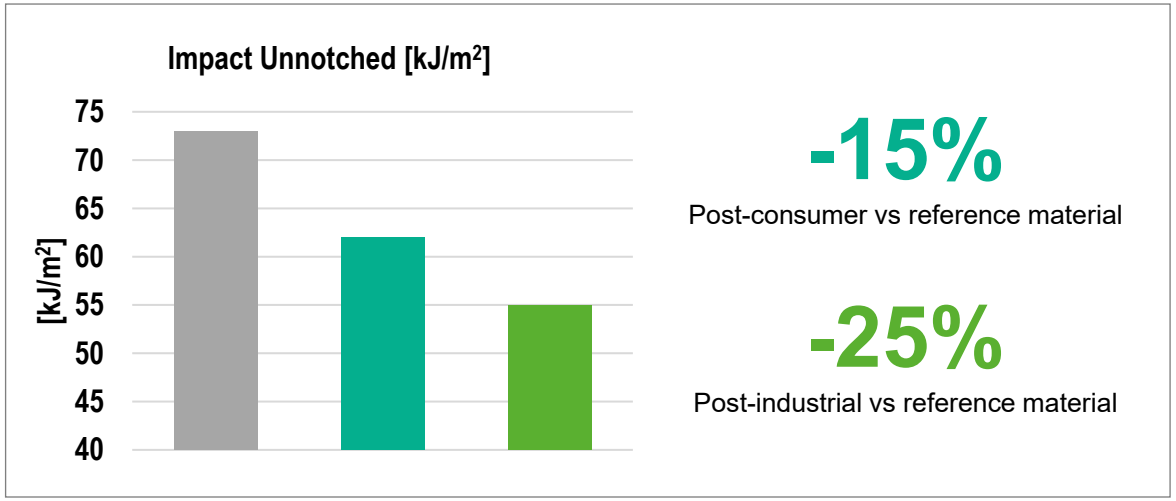
Name	Material Description	Market
RENYCLE S GF3004K 3030 BK	PA6-GF30, 100% PIR, heat stabilized	General purpose
RENYCLE A GF3002HR 3039 BK	PA66-GF30, HR, containing a PIR%	Auto
RENYCLE A GF3502K 3033 BK	PA66-GF35, containing a PIR%, heat stab	General purpose
RENYCLE A GF3504K 3033 BK	PA66-GF35, 100% PIR, heat stabilized	General purpose

RENYCLE® Grades: Mechanical vs environmental performance

PA6-RE from end-of-life industrial goods, 30% glass-fibre reinforced injection moulding grade. Heat stabilized, black colour.

Finished Product	Stress at Break [MPa]	Strain at Break [%]	Impact Unnotched [kJ/m^2]
RAD S RV300W 333BK *(Reference)*	173	3,2	73
RENYCLE S GF3001K 3030 BK	150	3,5	62
RENYCLE S GF3004K 3030 BK	130	2.5	55





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Why RENYCLE® ?

- Being more **sustainable** than virgin equivalents, it fuels the transition towards **climate neutrality** and **low-carbon footprint** business models.
- It allows for **waste reduction**, minimizing the amount of products sent to landfills or dispersed in the environment, and promotes a culture of **reuse and recycling.**
- It meets the needs of end-customers who are committed to make **environmentally conscious choices and support the development of a green-oriented product offering**.
- It is consistent with **the legislative context,** which is increasingly focused on the recovery of discarded materials (so-called EOL materials). Lawmakers aim to ensure **transparency**, **traceability** and **safety** for human health.
- It promotes collaboration with **partners that have consolidated experience** in designing sophisticated products using post-industrial and post-consumer recycled content.

THANK YOU FOR YOUR ATTENTION

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